

What is claimed is:

1. A bent axis hydrostatic unit, comprising,
a frame,
5 two yokes pivotally mounted on the frame to pivot on the
frame in intersecting paths,
stop means on the yokes and on the frame to limit the
pivotal movement of the yokes,
output shafts in the housing,
10 hydrostatic power units on each of the yokes operatively
connected to the shafts,
and a controlled power means for pivoting the yokes and
supplying pressurized fluid to the hydrostatic power
units.
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2. The hydrostatic unit of claim 1 wherein the yokes
define a neutral position for the cylinder blocks and the
shafts when in predetermined positions of pivotal movement,
and wherein the yokes can be pivoted within the following
20 parameters with "plus" meaning a clockwise direction from a
neutral position, and "minus" meaning a counterclockwise
direction from a neutral position: one yoke minus 45° and
one yoke minus 15°; one yoke plus 45° and one yoke minus
15°; one yoke plus 45° and one yoke minus 15°; one yoke plus
25 45° and one yoke plus 45°; one yoke minus 45° and one yoke
minus 45°; and one yoke 45° and one yoke at 15°.
3. The hydrostatic unit of claim 3 wherein the stops are
provided on the housing and the yokes to limit the maximum
30 rotation of each direction away or towards each other as the
yokes assume positions within the parameters.

4. A bent axis hydrostatic unit,
a frame,
two yokes pivotally mounted on the frame,
hydrostatic units on each yoke each connects to output
5 shafts on the frame,
servo pistons fluidly control the positions of each yoke,
and wherein a control system including a single piece
housing controls a flow of fluid to the servo pistons
and to the cylinder blocks to determine the orientation
10 of the yokes, and rotational power supplied to the
shafts by the cylinder blocks.

5. The hydrostatic unit of claim 4 wherein a fluid
manifold to serve as a conduit for high pressure fluid
15 between the cylinder blocks and which contains fluid valving
for the hydrostatic unit is rigidly directly secured in
close intimate proximity to the housing of the control
system, the manifold being stiff and rigid and comprising a
main structural element of the hydrostatic unit, with the
20 close intimate proximity between the manifold and the
control housing allowing simplified exchange of fluid
through common fluid ports therebetween.

6. The hydrostatic unit of claim 4 wherein a single piece
25 fluid control porting plate is secured to the hydrostatic
unit and single piece control housing to act as a manifold
to route hydraulic fluid to multiple locations within the
single piece control housing and to servo valves therein.

30 7. The hydrostatic unit of claim 4 wherein the porting
plate is directly connected to the single one-piece control
housing.

8. The hydrostatic unit of claim 1 wherein the yokes each have complimentary surfaces to each other and to the housing to minimize the magnitude of the space occupied by the yokes in some positions of their pivotal movement when the
5 complimentary surfaces on the housing or on the yokes are in closely spaced relation.

9. A hydrostatic module, comprising:
a frame;
10 a pair of spaced shafts rotatably supported by the frame and directed outwardly from the frame;
two yokes pivotally mounted on the frame to pivot with respect to the frame in intersecting paths, wherein each yoke has outer surface including a side wall and
15 an end wall;
a hydrostatic power unit carried by each yoke, and each hydrostatic power unit being operatively connected to one of the shafts to rotate the same;
a control system for pivoting the yokes; and
20 wherein the yokes each have complimentary surfaces to each other, wherein at least one of the complimentary surfaces is a contoured portion on at least one of the yokes outer surface that permits the end wall of one yoke to be positioned in closely spaced relation to the
25 side wall of the other yoke without the two yokes contacting one another.

10. The hydromodule of claim 9, wherein the hydrostatic power units are bent axis hydrostatic units.

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11. The hydrostatic module of claim 9, wherein the yokes are of single piece construction.

12. The hydrostatic module of claim 9, wherein the yokes contain integrated fluid passages.

13. The hydrostatic module of claim 9, wherein the yoke containing the contour portion has a yoke centerline that
5 pivots counter clockwise through an angle θ relative to a shaft centerline of that yoke, the other yoke has a yoke centerline that pivots clockwise through an angle α relative to a shaft centerline of that yoke, and the angle of the contour portion on the end wall of the yoke is equal
10 to $\theta + \alpha$ relative to the centerline of the yoke containing the contour portion.

14. The hydrostatic module of claim 9, wherein a contour rib on the frame is contoured to mate with the side wall of the yoke containing the contour portion.

15 15. The hydrostatic module of claim 14, wherein the yoke containing the contour portion has a yoke centerline that pivots counter clockwise through an angle θ relative to a shaft centerline of that yoke, the other yoke has a yoke centerline that pivots clockwise through an angle α
20 relative to a shaft centerline of that yoke, and the angle of the contour rib mating with the side wall is equal to $90^\circ - \theta$ relative to a surface of the frame perpendicular to the shaft centerline.

25 16. The hydrostatic module of claim 9, wherein stops are provided on the frame and on the yokes to limit the maximum rotation of each direction away or towards each other as the yokes assume positions within the parameters.

17. The hydrostatic module of claim 9, wherein the control system includes a single piece control housing containing servo pistons, the servo pistons adapted to independently establish the orientation of the yokes, and thus the
5 rotational power supplied to the shafts.

18. The hydrostatic module of claim 9, further comprising a fluid manifold to serve as a conduit for high pressure fluid between the hydrostatic power units and which contains fluid
10 valving rigidly and directly secured in close intimate proximity to the control housing, the manifold being stiff and rigid and comprising a main structural element of the hydrostatic module, with the close intimate proximity between the manifold and the control housing allowing
15 simplified exchange of fluid through common fluid ports therebetween.

19. The hydrostatic module of claim 9, further comprising a single piece fluid control porting plate secured to the
20 control housing to route hydraulic fluid to multiple locations within the control housing and to servo valves therein.

20. A hydrostatic module, comprising:
25 a frame;
a pair of spaced shafts rotatably supported by the frame and directed outwardly from the frame;
two yokes pivotally mounted on the frame to pivot with respect to the frame in intersecting paths;
30 a hydrostatic power unit carried by each yoke, and each hydrostatic power unit being operatively connected to one of the shafts to rotate the same;

a control system for pivoting the yokes; and
stop means on the yokes and on the frame to limit the
pivotal movement of the yokes.

5 21. The hydromodule of claim 20, wherein the hydrostatic
power units are bent axis hydrostatic units.

22. The hydrostatic module of claim 20, wherein the yokes
are of single piece construction.

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23. The hydrostatic module of claim 20, wherein the yokes
contain integrated fluid passages.

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24. The hydrostatic module of claim 20, wherein the yokes
define a neutral position for the cylinder blocks and the
shafts when in predetermined positions of pivotal movement,
and wherein the stops permit the yokes to be pivoted within
the following parameters with "plus" meaning a clockwise
direction from a neutral position, and "minus" meaning a
counterclockwise direction from a neutral position: one
20 yoke minus 45° and one yoke minus 15°; one yoke plus 45° and
one yoke minus 15°; one yoke plus 45° and one yoke minus
15°; one yoke plus 45° and one yoke plus 45°; one yoke minus
45° and one yoke minus 45°; and one yoke 45° and one yoke at
25 15°.

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25. The hydrostatic module of claim 24, wherein the stops
are provided on the frame and the yokes to limit the maximum
rotation of each direction away or towards each other as the
30 yokes assume positions within the parameters.

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26. The hydrostatic module of claim 20, wherein the control system includes a single piece control housing containing servo pistons, the servo pistons adapted to independently establish the orientation of the yokes, and thus the rotational power supplied to the shafts.

27. The hydrostatic module of claim 20, further comprising a fluid manifold to serve as a conduit for high pressure fluid between the hydrostatic power units and which contains fluid valving rigidly and directly secured in close intimate proximity to the control housing, the manifold being stiff and rigid and comprising a main structural element of the hydrostatic module, with the close intimate proximity between the manifold and the control housing allowing simplified exchange of fluid through common fluid ports therebetween.

28. The hydrostatic module of claim 20, further comprising a single piece fluid control porting plate secured to the control housing to route hydraulic fluid to multiple locations within the control housing and to servo valves therein.

29. A hydrostatic module, comprising:
a frame;
a pair of spaced shafts rotatably supported by the frame and directed outwardly from the frame;
two yokes pivotally mounted on the frame to pivot with respect to the frame in intersecting paths;
a hydrostatic power unit carried by each yoke, and each hydrostatic power unit being operatively connected to one of the shafts to rotate the same; and

a control system for pivoting the yokes, wherein the control system includes a single piece control housing containing servo pistons, the servo pistons adapted to independently determine the orientation of the yokes,
5 and thus the rotational power supplied to the shafts.

30. The hydrostatic module of claim 29 wherein a fluid manifold to serve as a conduit for high pressure fluid between the hydrostatic power units and which contains fluid
10 valving rigidly and directly secured in close intimate proximity to the control housing, the manifold being stiff and rigid and comprising a main structural element of the hydrostatic module, with the close intimate proximity
15 simplified exchange of fluid through common fluid ports therebetween.

31. The hydrostatic module of claim 29, wherein a single piece fluid control porting plate is secured to the control
20 housing to route hydraulic fluid to multiple locations within the control housing and to servo valves therein.

32. The hydrostatic module of claim 31, wherein the porting plate is directly connected to the single one-piece control
25 housing.

33. A hydrostatic module, comprising:
a frame;
a pair of spaced shafts rotatably supported by the frame and
30 directed outwardly from the frame;
two yokes pivotally mounted on the frame to pivot with respect to the frame in intersecting paths;

a hydrostatic power unit carried by each yoke, and each
hydrostatic power unit being operatively connected to
one of the shafts to rotate the same;
a control system for pivoting the yokes, wherein the control
5 system includes a control housing containing servo
pistons, the servo pistons adapted to determine the
orientation of the yokes, and thus the rotational power
supplied to the shafts; and
a fluid manifold to serve as a conduit for high pressure
10 fluid between the hydrostatic power units and which
contains fluid valving rigidly and directly secured in
close intimate proximity to the control housing, the
manifold being stiff and rigid and comprising a main
structural element of the hydrostatic module, with the
15 close intimate proximity between the manifold and the
control housing allowing simplified exchange of fluid
through common fluid ports therebetween.

34. The hydrostatic module of claim 33, wherein a single
20 piece fluid control porting plate is secured to the control
housing to route hydraulic fluid to multiple locations
within the control housing and to servo valves therein.

35. A hydrostatic module, comprising:

25 a frame;
a pair of spaced shafts rotatably supported by the frame and
directed outwardly from the frame;
two yokes pivotally mounted on the frame to pivot with
respect to the frame in intersecting paths;
30 a hydrostatic power unit carried by each yoke, and each
hydrostatic power unit being operatively connected to
one of the shafts to rotate the same;

a control system for pivoting the yokes, wherein the control system includes a control housing containing servo pistons, the servo pistons adapted to determine the orientation of the yokes, and thus the rotational power
5 supplied to the shafts; and

a single piece fluid control porting plate secured to the control housing to route hydraulic fluid to multiple locations within the control housing and to servo valves therein.

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